THIS OPINION WAS NOT WRITTEN FOR PUBLICATION

The opinion in support of the decision being entered today (1) was not written for publication in a law journal and (2) is not binding precedent of the Board.

Paper No. 18

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte DAVID A. WALKER

Appeal No. 97-2120
Application 08/226,164[1]

ON BRIEF

Before HAIRSTON, MARTIN, and TORCZON, Administrative Patent Judges.

HAIRSTON, Administrative Patent Judge.

DECISION ON APPEAL

This is an appeal from the final rejection (paper number

---

[1] Application for patent filed April 11, 1994.

12) of claims 3 through 6, 9, 11 and 12.

The disclosed invention relates to a method and apparatus for enhancing a seismic reflection signal received from a land-vibrator seismic system by passing the harmonics associated with the land-vibrator seismic system and the reflection signal through an inverse filter to yield a pulse compressed seismic signal which includes the harmonic energy.

Claim 11 is illustrative of the claimed invention, and it reads as follows:

11. A method of enhancing a seismic reflection signal received from a land-vibrator seismic system, which includes a baseplate coupled to the earth to induce seismic waves of varying frequencies, into the earth, said method comprising:

(a) recording a correlation operator (CO) signal which is representative of the actual motion of said baseplate and includes harmonics associated with said land vibrator system;

(b) determining an inverse filter responsive to said CO signal, said inverse filter having a pass-band that includes harmonics which are associated with said land vibrator seismic system; and

(c) passing said seismic reflection signal through said inverse filter to yield a pulse compressed seismic signal which includes harmonic energy injected into the earth by said land-vibrator seismic system.

The reference relied on by the examiner is:

Martinez 4,646,274 Feb. 24, 1987

Claims 3 through 6, 9, 11 and 12 stand rejected under 35 U.S.C. § 103 as being unpatentable over Martinez.

Reference is made to the brief and the answer for the respective positions of the appellant and the examiner.

OPINION

We have carefully considered the entire record before us, and we will reverse the obviousness rejection of claims 3 through 6, 9, 11 and 12.

Martinez discloses a method and apparatus for enhancing seismic data by removing phase distortion from deconvolved seismic data records generated via vibrational energy. According to Martinez (column 1, lines 24 through 27), deconvolution is a "form of inverse filtering which corrects for the previous filtering effects of the recording system and the earth itself." The land-vibrator seismic system disclosed by Martinez includes a baseplate 14 (Figure 1) coupled to the earth to induce seismic waves of varying frequencies into the earth. A ground force signal 34 is produced by the seismic system, and appellant acknowledges (Brief, page 5) that "the ground force signal (34 in FIG. 2 of Martinez) would inherently include harmonics produced by the vibrator system."

The ground force signal 34 and a reflected signal 32 detected by a geophone are simultaneously recorded by a recorder 38 (column 3, lines 20 through 25). In correlator 40, the ground source signal 34 is correlated with pilot sweep signal 42 to produce output trace 44, and the reflected signal 32 is correlated with pilot sweep signal 42 to produce output trace 46 (column 3, lines 26 through 30). Martinez indicates that "[o]ther signal pulses may be employed for this purpose instead of pilot signal 42, such as, for example, ground force signal 34 itself" (column 3, lines 61 through 63). The output traces 44 and 46 are thereafter subjected to the same standard processing technique to generate respective output traces 52 and 62 (column 3, line 66 through column 4, line 1). "A typical standard processing technique involves what is known as 'spiking deconvolution'" (column 4, lines 12 through 19). If this technique is used in Martinez, then "spiking" inverse filtering is used in the processing of the traces 44 and 46 to produce respective traces 52 and 62. "By means of inverse filter 54 trace 52 is time reversed to generate a correction function 56" (column 3, lines 33 through 35), and "[f]inally correcting signal 56 and processed data trace 62 are convolved

together at functional block 64 to produce a final corrected vibrator data output 66" (column 3, lines 38 through 41).

The examiner has concluded (Answer, page 5) that:

> The difference between [the] claimed invention and this reference lies in the claim recitation that the CO includes vibrator system harmonics which are passed by the inverse filter. However, the skilled artisan would find it obvious that seismic land vibrators driven by frequency varying sine waves inherently produce harmonics which are passed by inverse filter (54).

In response to appellant's argument (Brief, pages 6 and 7) that Martinez lacks an inverse filter with a passband that will pass harmonics, the examiner concludes (Answer, pages 6 and 7) that "inverse filters are by definition filters with characteristics complementary to another filter so that when used in series with the other filter no frequency-selective filtering occurs."

Nothing in the record before us supports the examiner's conclusion that the inverse filtering performed by Martinez will pass harmonics with the reflected signal. In the absence of evidence in the record, and the lack of a convincing line of reasoning by the examiner demonstrating how the inverse filtering performed by Martinez passes harmonics, the obviousness rejection of claims 3 through 6, 9, 11 and 12 is reversed.

DECISION

The decision of the examiner rejecting claims 3 through 6, 9, 11 and 12 under 35 U.S.C. § 103 is reversed.

REVERSED

KENNETH W. HAIRSTON Administrative Patent Judge	)	
JOHN C. MARTIN Administrative Patent Judge	)	BOARD OF PATENT APPEALS AND INTERFERENCES
RICHARD TORCZON Administrative Patent Judge	)	

svt

Richmond, Phillips, Hitchcock & Fish
P.O. Box 2443
Bartlesville, OK 74005